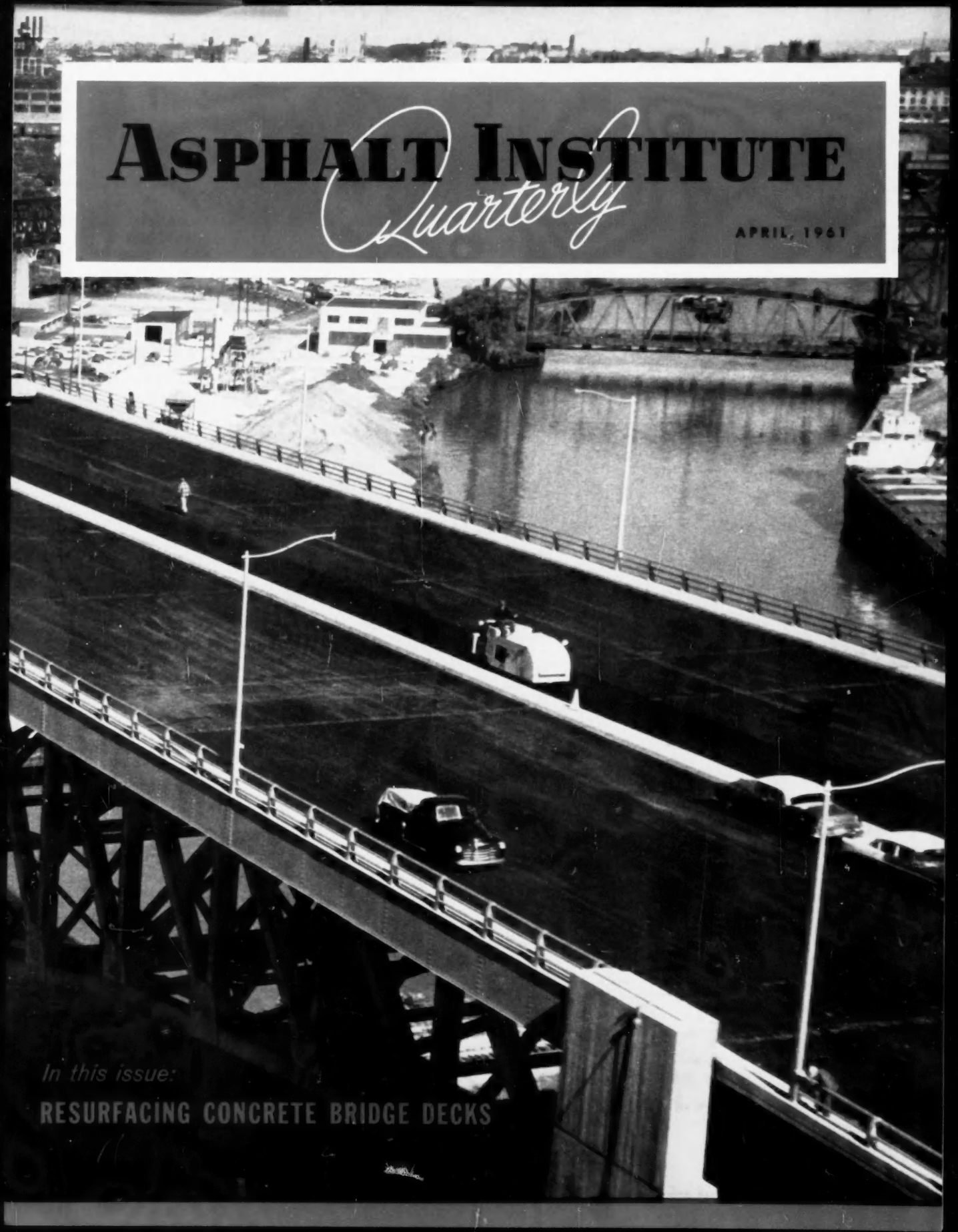
ASPHALT INSTITUTE *Quarterly*

APRIL, 1961



In this issue:

RESURFACING CONCRETE BRIDGE DECKS

EXISTING SURFACE MILEAGE ON STATE HIGHWAY SYSTEMS

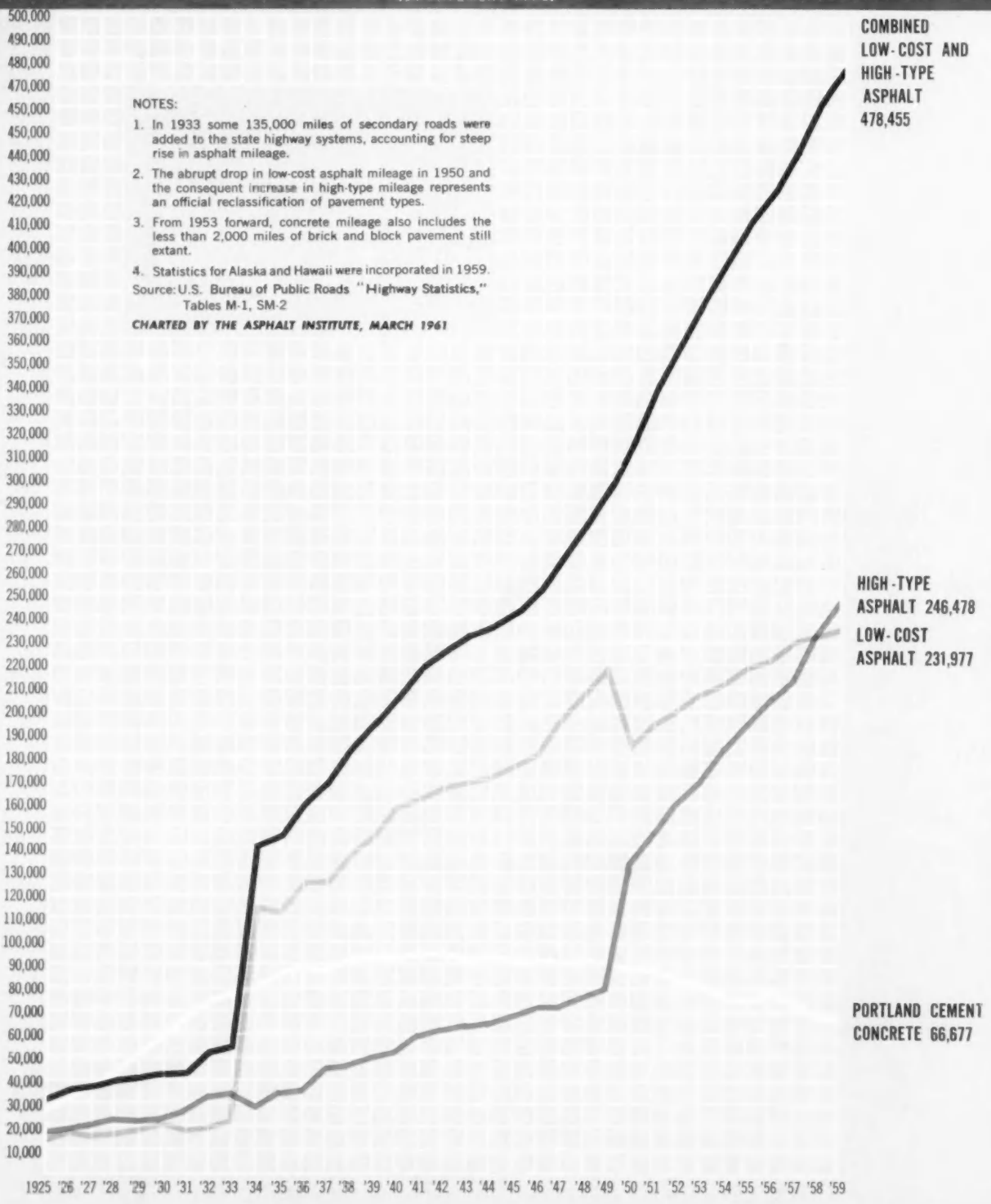
(BY PAVEMENT TYPE)

NOTES:

1. In 1933 some 135,000 miles of secondary roads were added to the state highway systems, accounting for steep rise in asphalt mileage.
2. The abrupt drop in low-cost asphalt mileage in 1950 and the consequent increase in high-type mileage represents an official reclassification of pavement types.
3. From 1953 forward, concrete mileage also includes the less than 2,000 miles of brick and block pavement still extant.
4. Statistics for Alaska and Hawaii were incorporated in 1959.

Source: U.S. Bureau of Public Roads "Highway Statistics," Tables M-1, SM-2

CHARTED BY THE ASPHALT INSTITUTE, MARCH 1961



ASPHALTOPICS

THE READERS ALWAYS WRITE DEPT.—Seems like the last time we gathered here in the shade of the old split infinitive, we passed along a query from Reader A. I. Watkinson of Yorkshire, England, who asked if we knew of any abandoned railroads in the United States now being used as motor roads. A couple of colleagues—Editor Jim Jenkins of the ARBA's *Road Builder* and Editor Bill Foster of *American City*—promptly reminded us that the Pennsylvania Turnpike follows an old railroad right-of-way. Another Bill—Phillips this time, and a consulting engineer in St. Charles, Mo.—points out that about fifty miles of the Lackawanna Trail between Scranton, Pa., and Binghamton, N. Y., are laid out on the old main line of the Lackawanna Railroad, and that the city of St. Louis is building an expressway on the abandoned Rock Island right-of-way. Meanwhile, Mr. Dallas Talbert of Churchton, Md. (who is neither engineer nor editor but who reads the *Quarterly* as a form of intellectual masochism) advises us that Palmer Highway, in suburban Washington, D. C., is built on the old right-of-way of the defunct Washington, Baltimore & Annapolis Railroad (or is it a branch of the Pennsy?), and that Old Dominion Drive in suburban Arlington and Fairfax counties lies on land originally dedicated to the use of the Washington & Old Dominion Railroad.

* * *

THE READER'S ALWAYS RIGHT DEPT.—As if things aren't bad enough, your editor, who was one of the early settlers in the Penobscot Valley, flunked his history test in the January issue. Messrs. Harry Sommer of Layfayette, Calif., George Burpee of New York's consulting firm of Coverdale & Pitts, and Leslie Johnstone of Chicago's Consoer, Townsend and Associates, all screamed their protests at a line in the article 'Maine Makes Do . . .' which credited Maine with being one of the thirteen original states. In fact, Mr. Johnstone, who received his stein from the University of Maine in 1905, gave us the whole low-down on early Maine—including the tale of how Dan'l Webster plied Lord Ashburton with strong drink until his Lordship, in an outburst of camaraderie, signed the treaty which fixed the present northern boundary of Maine in 1842. Of course, that was 22 years after Maine became known as the Maple Tree—uh—the Prune Tree State.

* * *

The only silent Tin Whistles this department ever knew were a band of superanuated golfers who tend to swarm at Pinehurst, N. C. in the fall and spring. But none, to our knowledge, ever was paved. Now we learn that Asphalt Paving Inc. of Wichita, Kan., has paved a "tin whistle"—which is a steel culvert (see photo) used as a passageway for horses beneath an exercise track at Wichita's Woodlawn Stables.

* * *

TODAY'S SNICKER—Remodeling of Chicago's Pick-Congress Hotel included installation of a new sidewalk of specially compounded black concrete . . . laced with Carborundum to give it a nonskid surface. If they keep playing around with that kind of thing long enough, one of these days their laboratories are going to stumble on the formula for asphalt pavement!

(Continued on page 14)

ASPHALT INSTITUTE Quarterly

Vol. 13, No. 2 **April, 1961**

Glynn Harvey
Editor

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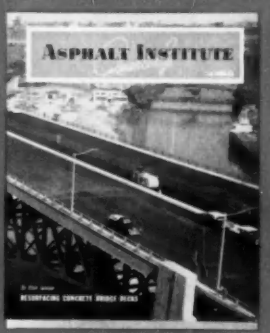
Cover

Impervious to de-icing salts and chemicals, water-tight asphalt concrete is the ideal surfacing for bridge- and viaduct-decks. Cover shot, by Roger Blum, is a dramatic view of Cleveland's new Innerbelt Viaduct which was opened to traffic July 31, 1959.



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The member companies of the Institute, who have made possible the publication of this magazine, are listed on page 15.

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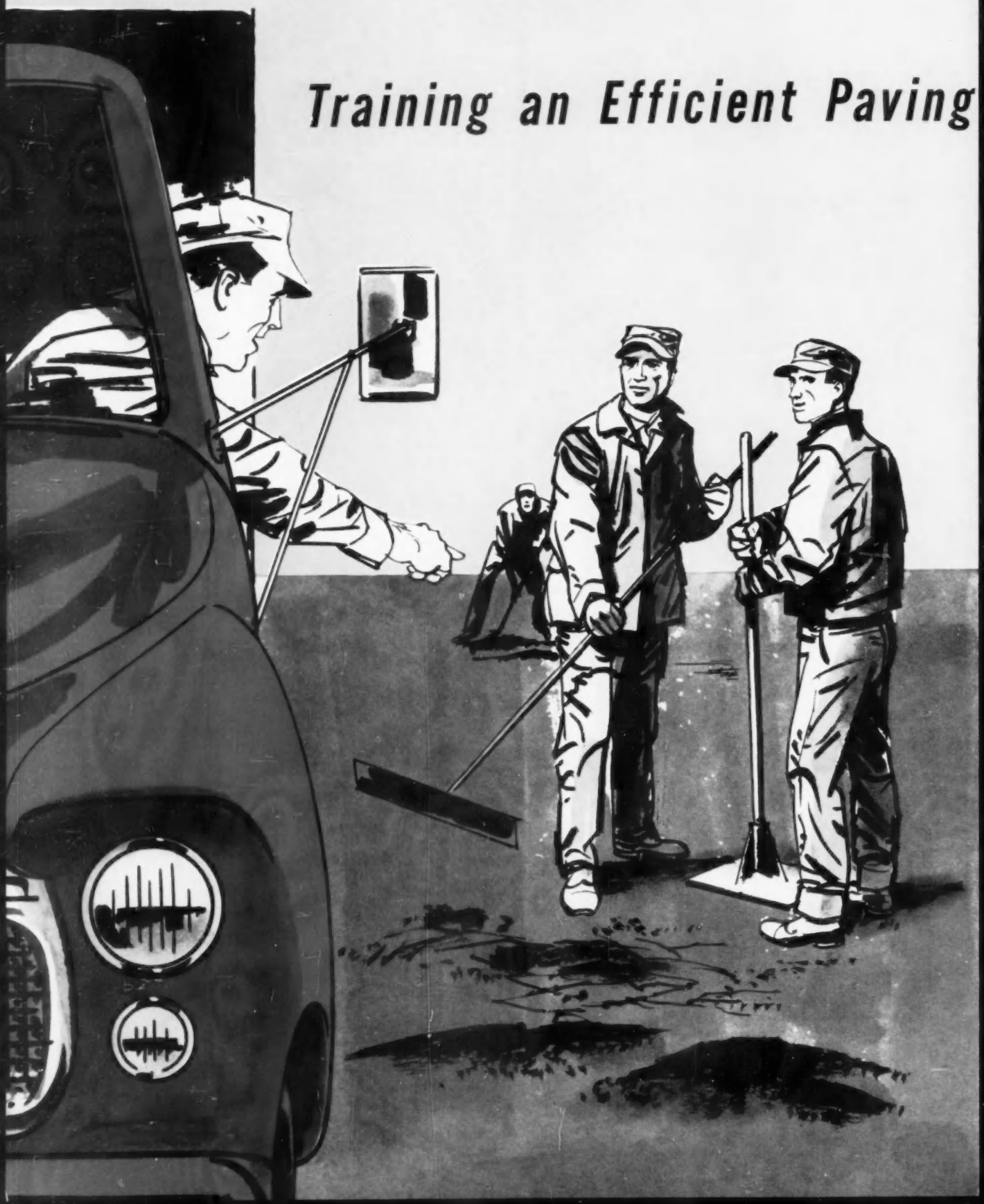
Training an Efficient Paving



Maintenance Crew

by W. W. Baker and Neal A. McCaleb

ABOUT THE AUTHORS

W. W. Baker was formerly on the faculty at Oklahoma State University, where he taught courses in highway engineering and related subjects. He did extensive research in the construction of seal coats and flexible paving design as particularly applied to Oklahoma Highways and Streets. He also helped conduct many short courses for City, State, County and Consulting Engineers in Flexible Paving Design. Mr. Baker is a registered professional engineer, member of Oklahoma Society of Professional Engineers, National Society of Professional Engineers. He is a vice president of the American Road Builders' Association, is active in the American Society of Civil Engineers and is presently serving on its National Board of Direction as the Director from District 14.

In 1957, Neal A. McCaleb received a B.S. degree in Civil Engineering from Oklahoma State University, where he was awarded a scholarship as the outstanding senior Civil Engineer. Following graduation, Mr. McCaleb was employed by Hudgins-Thompson-Ball & Associates, Consulting Engineers in Oklahoma City. Mr. McCaleb joined the staff of the Oklahoma City Engineering Department as Division Engineer in 1959 and is presently serving as Assistant City Engineer. Mr. McCaleb is Secretary of the Oklahoma City Branch of the American Society of Civil Engineers and is active in several state level committees of this organization. He is Vice-President Elect to the Local Chapter of the Oklahoma Society of Professional Engineers and also a member of the National Society of Professional Engineers.

a

b

c

Shown here are the three basic types of asphalt concrete maintenance problems. (A) Longitudinal cracks resulting from volumetric variation of highly plastic subgrade, red permian clay. (B) Deep-seated base failure resulting from surface water penetrating base material. (C) Surface raveling.

IN STREET maintenance, as in any other business, the effectiveness of the plan is no better than the ability of those persons responsible for getting it done, no matter how cleverly conceived the plan may be.

Unfortunately, the agencies of government largely responsible for street and highway maintenance rarely find themselves in the position of being able to compete with private enterprise for trained and highly qualified personnel to fill positions on paving maintenance crews. It follows that if these agencies are to achieve the higher rate of efficiency required by today's taxpayer, they must enter into some sort of training or educational program of their own for their personnel, to provide serviceable, safe and smooth streets for the motoring public.

Most street maintenance organizations are participating in such training programs, frequently without officially identifying them as such. In fact, the greater part of the training is "on the job," rather than costly classroom training. However, Oklahoma City has effectively stretched its street maintenance dollar with a small investment of "maintenance crew time" in formal training programs.

SEVERAL BASIC FACTORS

Although the scope of the maintenance problem for streets will vary according to the size and location of the street system, there are several basic factors involved, whether five miles or five thousand miles of paving are involved. For the sake of brevity the following remarks on paving mainte-

A standard patch crew in operation with numbers corresponding to those used in text.

nance training will focus only on flexible asphalt paving.

To teach untrained personnel how to patch and repair streets, the problem must first be defined, i.e., the different types of paving deterioration that exist, and the probable cause of failure. Since most street and highway systems—especially city street systems—are a motley collection of antiquated, poorly designed and constructed pavements (along with many new streets designed with all of the latest technical advances), it is obvious that the chief maintenance expense and training cost will have to be directed to these older streets.

Paving deterioration in Oklahoma City requiring maintenance usually is divided into three groups: deep-seated base failures, surface raveling and longitudinal shrinkage cracks (resulting from volumetric changes of highly plastic subbase material of red permian clays which cover large portions of central Oklahoma). The most expensive of these three types from the standpoint of a maintenance problem is, of course, base failure. The repair of surface raveling and longitudinal cracks may be postponed repeatedly since many times these problems are hardly noticeable to the motoring public. However, both surface raveling and longitudinal cracks will usually result in expensive base failure if allowed to progress unchecked until moisture from the surface can reach the subgrade through the base material.

PREVENTIVE AND CURATIVE

As a result of this, the maintenance program is divided into two component parts: preventive maintenance and curative maintenance. The preventive maintenance, of course, relates to skin patches for a surface raveling and seal coats or fillers for the longitudinal cracks. The curative repair involves the expensive procedure of cleaning out a bad paving failure and replacing it with new base and surface material.

The old adage "an ounce of prevention is worth a pound of cure" is certainly no more aptly applied than to this business of paving maintenance. If any one thought dominates the training program, it should be the importance of preventive maintenance.

For training to be effective it is necessary to have a well defined organizational structure in which each task is clearly defined. This presents somewhat of a practical problem since establishing rigid work responsibilities limits the versatility of the organization. For our work in Oklahoma City we have found that a rather large "patch crew" composed of seven men was about the best way to establish well-defined routines and still maintain a fairly high degree of versatility.

LARGE PATCH CREW EFFECTIVE

The large patch crews are very effective in covering many miles of city streets on routine patch work each working day, since each particular task in removing, preparing and patching a pavement failure can be efficiently delegated to a different man on each crew. The photograph shows the seven men who make up each patch crew. The foreman (1) acts as truck driver and is on hand at all times. The man to the far left (2) goes ahead of the truck removing any loose material from the area to be patched and sets up traffic warnings well ahead of the actual patch work. Next comes the man responsible for preparing for the new asphalt to be placed (3), He paints the cleaned area, and in cold weather applies hot irons to the edges to insure a bond between the new and the existing asphalt. Now comes the truck with the man in the dump bed (4) who distributes the hot patch manually to those areas previously prepared.

If any one man sets the pace of the patch crew, it is this man in the dump bed, since an error in his estimate

Patch trucks being loaded for day's work at Oklahoma City asphalt plant.

of the amount of material needed for the patch can slow the crew down to a snail's pace. Two men, (5) and (6), are rakers who distribute the asphalt in the hole to provide for a smooth-riding surface. This man (7) carries a hot iron to sear or seal the patch closed at its joint and even further provides for a smooth patch. Usually one of the rakers will pick up the warning cones and apply limestone dust to the surface of the patch to keep it from being picked up by car tires before it has cooled.

This arrangement not only provides for a swift-moving and effective patch crew, but also provides for a minimum of interference with normal traffic, since the work area may be confined to the edge of the road and will not congest the roadway.

LEARN-AS-THEY-EARN

Obviously, this method of operation allows a new man to be trained in the field by drawing from the experience of his fellow workers, without noticeable delay of the progress of the crew. Salaries are comparable to the degree of skill involved for each task. This supplies the necessary incentive to learn and new men are usually well integrated into the functioning organization in a short time.

This type of crew organization has also been very satisfactory from the standpoint of versatility. These crews perform equally as well on small resurfacing jobs and joint sealing as they do on routine patching. In periods of emergency these crews are easily divided to cover larger areas simultaneously.

As was previously stated, this type of organization minimizes the need for formal classroom training and, as a result, our training program was more or less taken for granted until March of 1960 when unusual ice, snow and rainstorms in the months of December, January and February left our city streets in a badly deteriorated condition with all types of failure showing up in all our streets at the same time. With the spring rainy season about to begin, it was imperative that emergency steps be taken to protect previous investment in our preventive maintenance and training program.

PROVED IN CRISIS

As a result of this emergency, additional equipment was purchased to outfit seven new patch crews at the same time. Forty-nine new and untrained men were hired to staff these crews. Had it not been for our large, experienced and well-trained patch crews then operating, chaos would have resulted. The real benefits of this crisis were obviously to make us appreciate the need for a well-planned and continuing personnel training program.

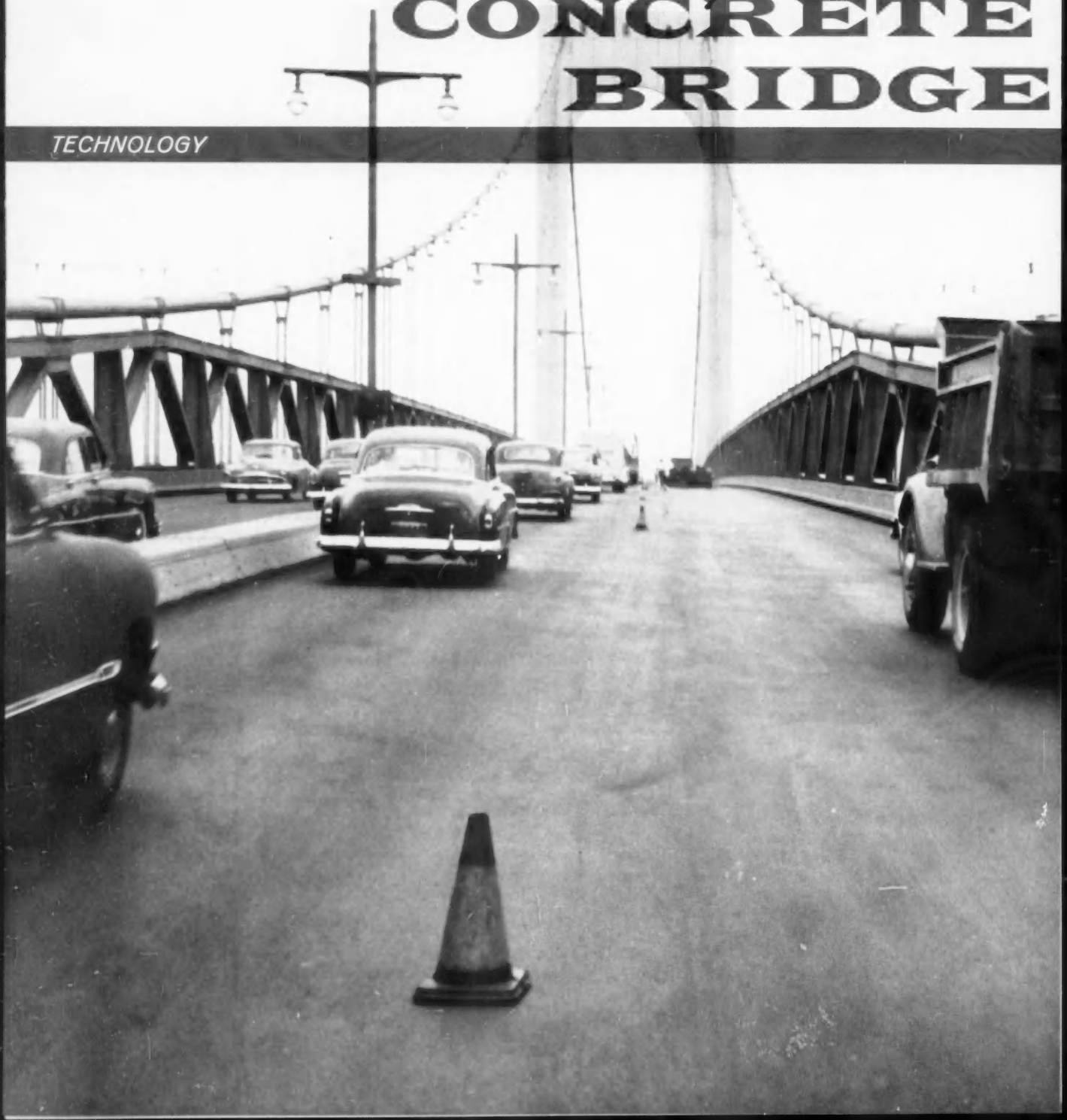
Most of the formal classroom training is necessarily limited to supervisory personnel. They in turn conduct their own classes to train their subordinates. The city actively participates in many authoritative conferences or meetings on asphalt paving maintenance, and we have found that invariably supervisors appreciate the importance of vigilant maintenance after they are exposed to fundamental design criteria, and for this reason we continue to send our maintenance supervisors to asphalt design short courses and seminars at regular intervals.

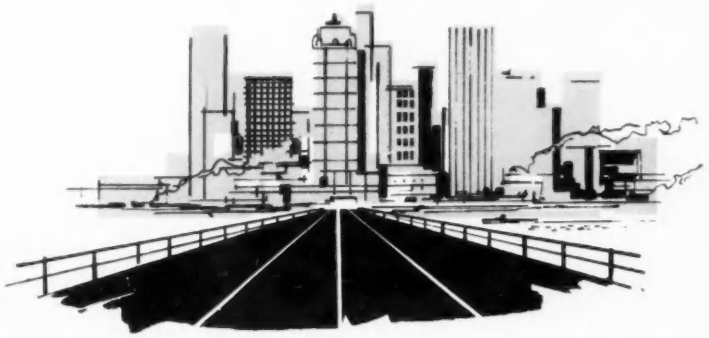
Three essential rules to follow in implementing an effective training program are: (1) define the problem (types of failures and causes); (2) define the solution (each task involved; (3) impress on the trainee the importance of the maintenance program.

There is no substitute for trained and enthusiastic personnel.

Resurfacing CONCRETE BRIDGE

TECHNOLOGY





DECKS

De-icing chemicals can wreak havoc on concrete bridge decks as this picture of one of the spans on the New York Thruway shows.

IN 1958, only four years after the opening of the New York Thruway main stem, the Thruway Authority launched a desperate three-year, $3 million program to resurface 572 of its concrete bridges. De-icing salts and chemicals were ravaging the decks—eating into the concrete and steel reinforcing.

The alarming disintegration of the Thruway structures simply dramatized a problem of national dimensions that has been growing increasingly serious in recent years.

BECOMING GRAVE PROBLEM

There are more than 78,000 bridges in the United States, not including a substantial mileage of viaducts. Because of exposure from above and below, bridge floors accumulate ice faster than earthborn surfaces, and therefore, require more salts for ice removal. Thousands of bridges have been badly eroded by these de-icing chemicals. Asphalt is unaffected by salts, therefore, resurfacing damaged bridge floors with the proper asphalt mixture offers the only practical way out of a serious dilemma.

There are three principal types of bridge floors: portland cement concrete slabs, steel, and wooden decks. Because of

First step in the resurfacing program is to clean away all loose material down to sound concrete, using air hammers, if necessary.

Spraying an asphalt emulsion tack coat on the prepared and patched concrete base is a must, serving to anchor the asphalt concrete mat to the rigid bridge deck.

space limitations, this discussion will be limited to salvage of concrete bridge decks.

Bridges with portland cement concrete floors often scale down to the reinforcement and frequently are so badly cracked that melt-water and concentrated salts will penetrate deep into the slab and damage the main reinforcing bars.

INSTITUTE STUDY MADE

Because these conditions exist throughout the northern part of the United States and in Canada, The Asphalt Institute assigned a group of asphalt technologists to study the problems. This group made a survey of bridges in the United States, Canada and Europe and after several conferences published the following recommendations:

(1) Thoroughly clean all loose, scaled, and foreign matter down to clean, sound concrete, using air hammers (if necessary), power wire brooms, and compressed air. Flush with high pressure fresh water to remove all salt deposits.

(2) Cut all cracks to a clean rectangular trench, usually not less than one-half inch wide by 1½ inches deep.

(3) Fill these trenches to one-half inch below their tops with a high softening point asphalt mastic or joint filling compound which will adhere to the sides and stretch without cracking throughout any possible movement or temperature changes.

(4) Paint the surface of the concrete for three to four inches on both sides of the trench with asphalt emulsion, Type SS-1h, and cover with 30-pound asphalt impregnated felt four inches wider than the trench.

(5) Provide mechanical water-stops, drainage, and expansion dams at all moving expansion joints.

(6) Cover the entire surface with a tack coat of 0.05 to 0.20 gallon per square yard of SS-1h emulsion diluted half and half with water. Vertical surfaces should also be painted to above the thickness of the subsequent asphalt courses. Scrub in the tack coat.

(7) Lay from ¾ inch to a maximum of 1½ inches of asphalt concrete leveling course (Asphalt Institute mix Type IVa) and compact to proper density.*

* The dead load strength of the bridge, the height of the expansion dams, drainage gratings, and other appurtenances will control the final thickness of the asphalt concrete surfacing.

(8) Cover the entire leveling course with a tack coat of 0.05 to 0.10 gallon per square yard of SS-1h emulsion diluted half and half with water.

(9) Lay the binder course (Asphalt Institute mix Type IVa) to a thickness within ½ inch to ¾ inch of the finished pavement grade.

(10) Lay the final or wearing course to a depth of ½ inch to ¾ inch. Sheet asphalt (Asphalt Institute mix Types VII or VIII) should be placed where chemicals are expected to be used to de-ice the pavement. Where de-icing chemicals will not be used, Type IVa mixes can be used for the wearing course. In areas where chemicals are used for ice control, aggregates that will not react with the de-icing chemicals should be selected.

(11) Roll all courses with steel wheel rollers and pneumatic tire equipment capable of producing at least 80 pounds per square inch contact pressure. Areas not accessible to this equipment should be compacted with small vibratory compactors or hand tamped.

(12) Cover the wearing course, for a distance of from 12 inches to 18 inches out from the curbing, with hot asphalt cement (85-100 penetration grade) by mopping or spraying. (This should be a yearly operation since traffic will rarely use this small portion of the floor.)

SUBSTRUCTURE TREATMENT

In localities where bridge structures are subjected to use of chemicals for ice control, absorption might occur due to condensation or surface drain spillage. To prevent penetration of the concrete deck by the absorbed solutions the underdeck or substructure of exposed sections should be treated with three applications of dilute SS-1 or SS-1h emulsion. The emulsion can be applied by spraying.

(For detailed information on surfacing of new portland cement concrete bridges, steel floor bridges and wood deck bridges, see the third printing of revised edition, The Asphalt Handbook, Asphalt Institute Manual Series No. 4.)

Frequently, it is advisable to clean the scaled concrete down to the steel reinforcements before tacking and spreading the asphalt mixture.

This is the resurfaced bridge deck, showing the dense asphalt concrete mat which is impervious to the corrosive effects of de-icing chemicals.

DITCH PAVING A LA MODE

Special Equipment Developed for Interstate Project in Tennessee

INTERSTATE Route 40 threads its way through the rugged Cumberland mountains in Tennessee. This means, to the highway builder, plenty of heavy grade cuts requiring a lot of ditch construction.

This can be a real headache, leading frequently to sloppy, indifferent ditch paving with a maintenance hangover for the highway department in the early future. But on Project I40-7(8)352 on the eastern slope of the Cumberlands below Kingston, the Knoxville Construction Company, working with the Warren Brothers Company, rigged up some interesting special equipment that handled the ditch-paving job efficiently and effectively.

A Cat grader with a templet bolted to the moldboard was used to shape the ditch and spread the one-inch stone insulation course. Then the hot asphalt mixture was placed with a widening spreader which operated off the twelve-foot premixed shoulders. A templet, shaped to the contour of the ditch, was bolted to the strike-off plate, with three adjustable screws to control the proper thickness of the mixture. A special belt conveyor and strikeoff assembly was extended three feet to accomplish the specified six-foot ditch design.

SPECIAL ROLLER DESIGNED

The mix then was compacted with a specially designed six-foot metal roller weighing 1,200 pounds. This roller was attached to a six-inch I-beam eight feet long, bolted to the bottom of a front-end loader bucket. An adjustable bracket from the I-beam to the roller yoke served to equalize the weight to the roller. An improvised sprinkling system was set up by fitting a 55-gallon oil drum in the loader bucket with a hose connection that ran along the roller yoke.

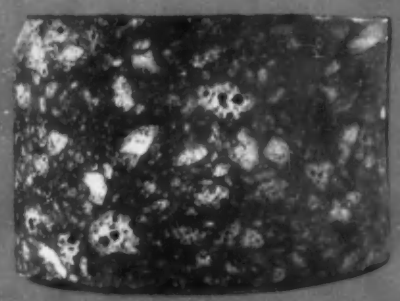
Other special equipment was designed for medium ditch paving and for flat-bottomed run-off ditches in inaccessible locations.

In all, a total of 6,631 tons of binder mix was placed at a rate of 550 tons per day and at a reasonable cost, fitting neatly into the production capacity of a small plant and requiring a minimum amount of labor.

Mix is placed with spreader, modified to follow contour of ditch.

Templet on strike-off plate has three screws to control thickness.

Compaction was done with specially designed 1200-lb. metal roller.



Core of slag-mix material taken from Bay Street in front of new Jacksonville City Hall (above).

TRUE to TYPE

JACKSONVILLE, FLORIDA SOLVES ITS STREET

by
Bill L. Bryant, City Engineer
City of Jacksonville, Florida

THE irregular pattern of traffic flow and the usual diversity of original construction make street building and maintenance a complex problem in any metropolitan area.

However, capitalizing on the versatility of asphalt, Jacksonville—Florida's second largest city—has taken a long step toward simplifying the problem. Instead of relying on a single asphalt paving mixture, as we did for years, we have designed two new and separate mixes. Together they serve a multitude of purposes, and, we feel, have spelled out added durability and economy in our street program.

ALL-PURPOSE MIX SHELVED

For many years, the City of Jacksonville's specifications covering asphaltic materials used in street work provided for a coarse aggregate binder first course and a standard sheet asphalt second course, or wearing surface. While this combination had always given fairly satisfactory service, we felt there were several reasons why we should make a change in the mix design.

The pressing need for revision seemed to revolve around the sheet asphalt. Though the particular specifications covering the coarse aggregate binder being used in the early 1950's left something to be desired (and since has been

TYPE I (SLAG AGGREGATE)

Materials:
1. #16 Slag—Birmingham Slag Company
2. #18 Slag—Birmingham Slag Company
3. Local Sand
4. Interlachen Sand
5. Filler, Cement
6. AP-3, 50-60 Pen.

GRADATIONS

% Passing	# 16 Slag	# 18 Slag	Local Sand	Interlachen Sand	Filler
½" Sieve	100.0	100.0			
⅜" Sieve	69.0	99.4			
# 4 Sieve	39.1	52.7		100.0	
# 10 Sieve	12.7	18.2		96.4	
# 40 Sieve	6.0	4.5	100.0	46.4	
# 80 Sieve	5.0	3.4	73.0	2.6	
#200 Sieve	2.4	3.0	3.6	0.0	92.0
Apparent Specific Gravity	2.36	2.39	2.64	2.66	3.10

BLEND

#16 Slag	55%
#18 Slag	13%
Interlachen Sand	17%
Local Sand	10%
Filler	5%

JOB MIX FORMULA

#16 Slag, %	51.15
#18 Slag, %	12.09
Interlachen Sand, %	15.81
Local Sand, %	9.30
Filler, %	4.65
Asphalt, %	7.00
Total, %	100.00

BLENDED GRADATION

% Passing ½" Sieve	100.0
% Passing ⅜" Sieve	82.9
% Passing # 4 Sieve	60.4
% Passing # 10 Sieve	40.8
% Passing # 40 Sieve	26.8
% Passing # 80 Sieve	15.9
% Passing #200 Sieve	6.5

Hubbard-Field Stability, lbs.	4525.
Theoretical Density	2.240
Laboratory Density	2.149
% of Theoretical Density	95.9

		Specifications
% Passing ½" Sieve & Retained on ⅜" Sieve	17.1	8-39
% Passing ⅜" Sieve & Retained on # 4 Sieve	22.5	8-45
% Passing # 4 Sieve & Retained on # 10 Sieve	19.6	9-27
% Passing # 10 Sieve & Retained on # 40 Sieve	14.0	5-22
% Passing # 40 Sieve & Retained on # 80 Sieve	10.9	9-27
% Passing # 80 Sieve & Retained on #200 Sieve	9.4	5-18
% Passing #200 Sieve	6.5	5-8

PROBLEMS WITH TWO MIX TYPES

changed and strengthened), at that time the sheet asphalt was the focal point of our concern.

In addition to a comparatively low stability, it was susceptible to wear under heavy traffic. The contractors and their personnel disliked it because of the difficulty encountered in placing and compacting it satisfactorily. It had a tendency to "pull" while being laid down, requiring considerable sanding and luting. Obviously we did not have aggregates available that would produce a high type sheet asphalt.

All in all, we decided it was time for a change.

TWO MIX DESIGNS

After a great deal of study and investigation, we came to the conclusion we needed two different mix types to adequately and economically surface our streets. Our needs seemed to dictate one mix to be used primarily on lightly traveled streets, and a second extra high-quality asphalt concrete for arteries carrying heavy traffic loads.

To meet the first need, we designed a mix called "City of Jacksonville Type II Asphaltic Concrete." Type II is used on residential or light-traffic streets as a finish course for resurfacing old pavements, or for a surface course in new construction.

It has a minimum stability (Hubbard Field at 140 deg. F.) of 2500 psi, and the aggregate content consists of approximately seventy percent screenings and thirty percent local sand; six or seven percent bitumen, having a 50-60 penetration, is used in the mix.

This mixture is easy to manufacture, easy to lay and gives adequate service on the streets for which it was designed. It also provides some latitude of choice insofar as initial cost is concerned.

THREE REQUIREMENTS

For the downtown streets and similar heavy-traffic arterials, we came up with a mix called "City of Jacksonville Type I Asphaltic Concrete." This was designed with three basic requirements in mind:

The first consider[illegible]as to pattern something which would provide sufficiently high stability to resist movement when subjected to lateral forces created by the braking of heavy buses and trucks.

Second, we wanted to provide a surface which would suffer a minimum of abrasive wear from traffic. My colleagues and I felt this could best be accomplished with a mix having a fairly high percentage of hard, durable coarse aggregate with a maximum size of one-half inch. This mix was to be used both for resurfacing and as a surface course in new construction.

Third, we knew we needed a mix versatile enough to be used as a leveling course over the irregular surface of old streets which would be finished with a surface course of the

TYPE I (STONE AGGREGATE)

Materials:
1. #16 Stone—Sunnyland, Florida
2. #18 Stone—Florida Rock Products
3. Interlachen Sand—Shands & Baker, Inc.
4. Local Sand
5. Filler
6. Asphalt, 50-60 Pen., Specific Gravity 1.021

% Passing	#16 Stone	#18 Stone	Interlachen Sand	Local Sand	Filler
¾" Sieve	100.0				
½" Sieve	100.0				
⅜" Sieve	69.2	100.0			
# 4 Sieve	34.7	63.1	100.0		
# 10 Sieve	5.8	2.9	95.0	100.0	
# 40 Sieve	3.9	.4	40.0	99.6	100.0
# 80 Sieve	2.6	.3	5.1	59.0	94.0
#200 Sieve	1.3	.2	.4	3.0	82.0
Apparent Specific Gravity	2.61	2.63	2.65	2.64	2.74

AGGREGATE BLEND

#16 Stone	38%
#18 Stone	27%
Interlachen Sand	17%
Local Sand	13%
Filler	5%

BLENDED GRADATION

% Passing	% Retained On	Results	Specifications
½" Sieve	⅜" Sieve	11.7	8-39
⅜" Sieve	# 4 Sieve	23.1	8-45
# 4 Sieve	# 10 Sieve	28.0	15-40
# 10 Sieve	# 40 Sieve	10.9	5-22
# 40 Sieve	# 80 Sieve	12.0	9-27
# 80 Sieve	#200 Sieve	9.0	5-18
#200 Sieve		5.3	5-8

HUBBARD-FIELD STABILITY TEST AT 140°F

% Bitumen 50-60 Pen.	Density	Hubbard-Field Stability at 140°F
6%	2.24	4900
6%	2.25	4750

same material. Naturally, from a standpoint of economy, we felt it important to use aggregates which were readily available in our locality, and which not only met our quality needs but also fitted our gradation requirements.

We sent the mix to Pittsburgh Testing Laboratory for a two-part analysis—one covering a coarse aggregate known as Sunnyland stone, which is mined in Florida, and the other covering Birmingham slag, which is shipped in from Birmingham, Alabama.

The detailed laboratory reports are given here for your information.

MORE ASPHALT FOR SLAG MIX

A point of interest might be the different bitumen content of the two mixes. Because of the porosity of the slag, a higher bitumen content is required in that particular combination. The Interlachen sand referred to in the lab report is a coarse-grained, sharp, angular sand mined near Jacksonville.

These aggregates, when blended correctly, will easily provide the required 4500 pounds minimum stability. You will note we specify a 50-60 penetration asphalt.

One of the challenging assignments given to Type I Asphaltic Concrete was the resurfacing of downtown Bay Street. There could hardly have been a tougher proving ground for the new mix than this traffic-clogged arterial. Though it serves both the imposing new Jacksonville City Hall and the equally imposing new Duval County Court House, Bay Street was then a brick-surfaced relic about as rough and irregular as a main street can be.

Yet a very satisfactory resurfacing job was accomplished by first applying a leveling course of Type I with a motor patrol, then following it with a 1½-inch surface course placed by an asphalt finishing machine.

The coarse aggregate in this mix was slag. The stability of the material was well in excess of the 4500 psi requirement. For compaction on both courses, we used rubber-tired and steel-wheel rollers.

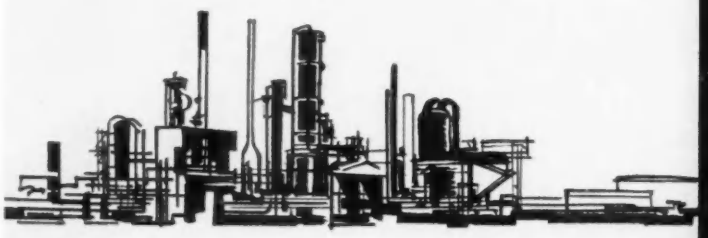
Accompanying pictures include a closeup view of a core taken from the Bay Street project.

SIMILAR TO STATE MIX

As a matter of interest, there is a rather striking similarity between Jacksonville's Type I asphaltic concrete and that used by the Florida State Road Department. The main difference is that the City of Jacksonville used a blend of No. 16 and No. 18 stone, while the state uses what is known as "State Road No. 16 Modified," which is a smaller stone. Another point of difference is that the city uses a 50-60 penetration, while the highway department employs an 85-100 penetration grade.

We feel we have every reason to be highly pleased with this new material. Even though it has been in use for less than three years, close observation indicates that the wear experienced by the coarse aggregate is so low as to be almost imperceptible. Because of this lack of wear, the loss of fines in the mix under traffic is noticeably retarded. Therefore it is easy to understand why the surface has not "shined" and become smooth and slippery when wet.

As yet, we have found no evidence of movement under traffic, nor of cracking because of weather, oxidation or other reasons which might be attributed to the mix itself.



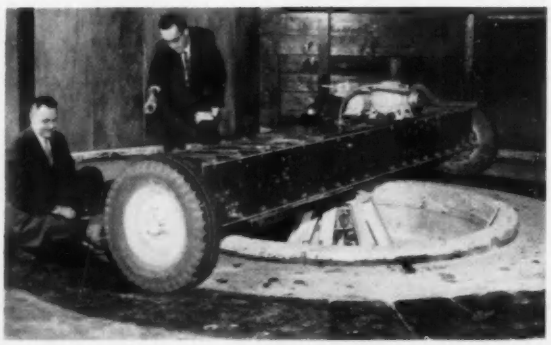
ASPHALTOPICS

(Continued from page 3)

OPERATION BLOWHARD—The Bureau of Standards, acting at the urging of the Army, Navy and Air Force, has completed a study of "self-sealing" asphalt roofing shingles. Seems the three services have been losing shingles at their installations during high winds and offered to sponsor the investigation of improved types. The study was centered on two types of shingles: one type which is applied with small amounts of plastic cement placed on the underside tabs, the second (and becoming increasingly popular) has the underside of the shingle treated with an asphaltic adhesive during manufacture. The sun, blazing down on the roof, completes the self-sealing process. For a copy of the report, write for Summary Technical Report-2552, Office of Technical Information, U.S. Department of Commerce, Washington 25.

* * *

Armed with $66,000 furnished by industry, the University of Illinois is in the test track business. The circular track—thirty inches wide and 28 feet in diameter (see picture)—is being used to determine design standards for use of fly ash which is piling up as a waste product of the big power plants. At Illinois it is being used as a base material beneath asphalt surfacing for possible application in the construction of secondary roads and streets—particularly in Illinois. Photo shows Engineer of Research E. W. Chastain of the Illinois State Division of Highways, and his son, E. W. Chastain Jr., a graduate research assistant at the University.



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PILLAR-OF-FIRE SECT: Proving that there's more than one way to skin a cat, or prepare a pavement cavity for an asphalt filling, consider the technique used with success by W. G. Cunningham, director of the Dept. of Streets and Public Improvements at Harrisburg, Pa. In Harrisburg's darkest hour this winter, with the temperature hovering at the zero mark, it became imperative to do some pothole patching. Mr. Cunningham's foreman suggested pouring gasoline into the pothole and touching it off with a match. The resulting conflagration warmed up the work crews momentarily, effectively dried out the hole, softened the adjacent asphalt, and enabled the crew to place a cold patch that today—three months later—is tight and handsome. Necessity, as the man says, is still the mother of invention.

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(As of April 1, 1961)

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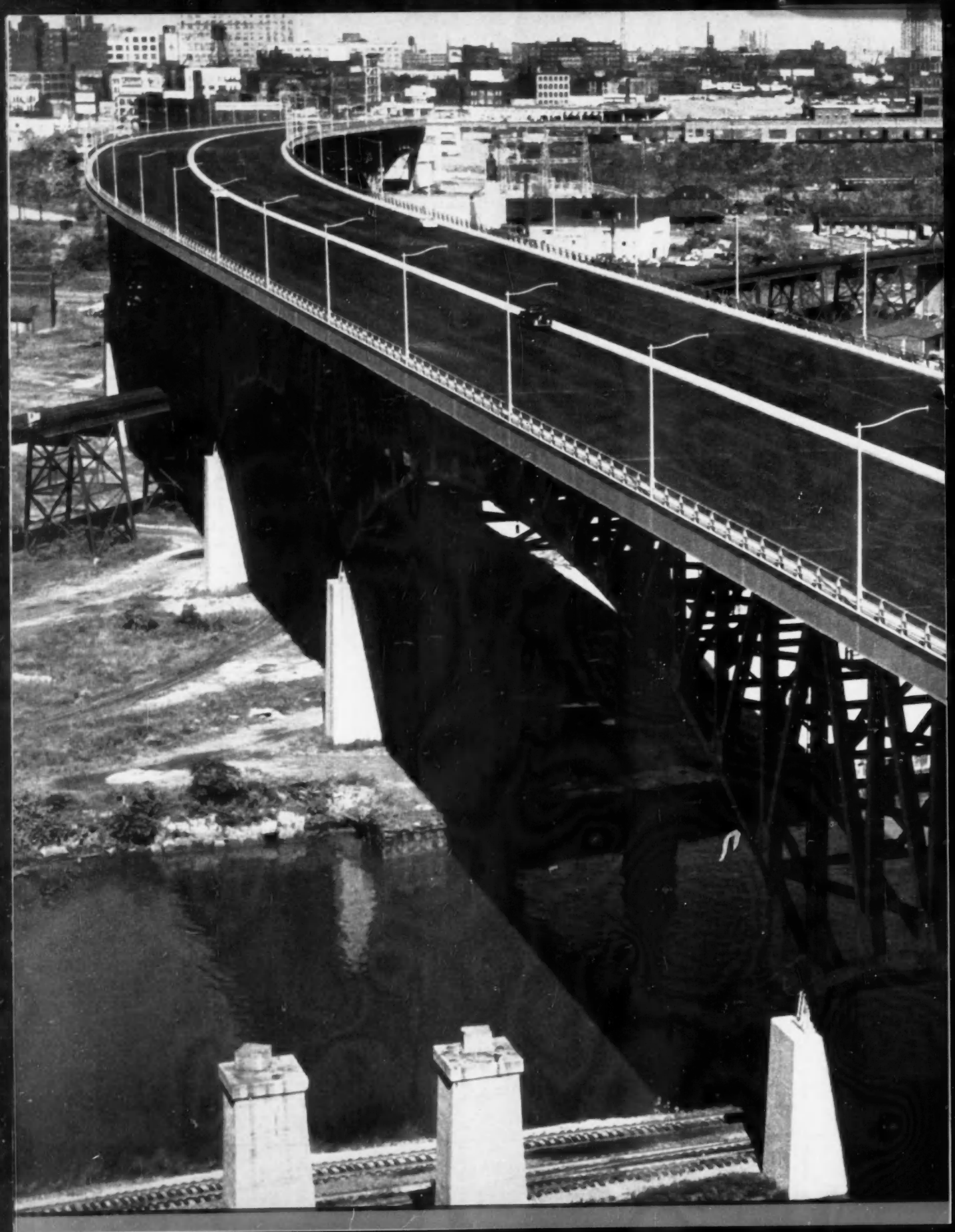
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